



Benthos and Plankton Assessments

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Benthos & Plankton at AOCs

Collect data to evaluate the status of benthos and plankton communities in selected Lake Michigan Areas of Concern (AOCs) in comparison with non-AOC comparison sites.

Compare benthos and plankton communities at each AOC with communities at comparison paired non-AOC comparison sites and, for WI only, non-AOCs as a group.

Provide input to the decision-making process for each AOC regarding whether the communities do not significantly differ from paired-non AOCs

- **Wisconsin AOCs**
 - Lower Menominee River
 - Fox River/Green Bay
 - Sheboygan River
 - Milwaukee Estuary
- **Coop with WI DNR/GLRI**
- **Illinois AOC**
 - Waukegan Harbor
- **Coop with IL DNR/GLRI**

USGS Sampling – Benthos & Plankton

Wisconsin AOC Sites

- 1 Lower Menominee River (5,6)
- 2 Green Bay-Fox River
Green Bay
Fox River (7,8)
- 3 Sheboygan River (8,9)
- 4 Milwaukee Estuary
Milwaukee River (9,10)
Menomonee River (9,10)
Milwaukee Harbor

Illinois AOC Site

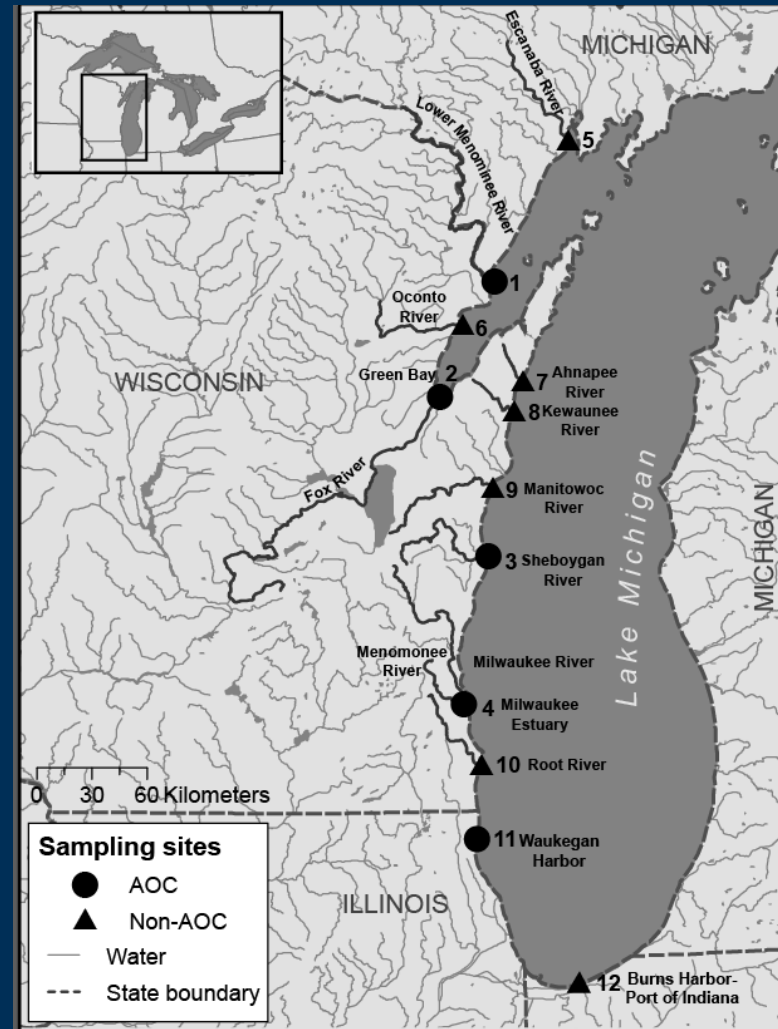
- 11 Waukegan Harbor (12)

Non-AOC Comparison Sites

- 5 Escanaba River
- 6 Oconto River
- 7 Ahnapee River
- 8 Kewaunee River
- 9 Manitowoc River
- 10 Root River
- 12 Burns Harbor-Port of Indiana

Boat required!

All sites are non-wadable



Data collection

WI: 3 visits (May/June, July, August)
IL / IN: 2 visits (June and August)

- **BENTHOS**

- **Ponar Dredge**

- Benthic invertebrates (>500 micron)
 - Sediment percent sand/silt/clay
 - Sediment volatile loss-on-ignition (~organic carbon)

- **“Hester Dendy” (HD) Artificial substrate deployed for 6 weeks**

- Benthic invertebrates (>500 micron)

- **PLANKTON**

- **Plankton Net**

- Zooplankton (microcrustaceans and rotifers >63 micron)

- **Whole Water Sampler (Kemmerer)**

- Phytoplankton (diatoms and non-diatoms or “soft algae”)
 - Chlorophyll-a, ash-free dry mass

- **WATER**

- **Multi-Parameter Sonde**

- Temperature, pH, DO, and Specific Conductance at 1m depth

BENTHOS

Ponar
Dredge



Hester-
Dendy (HD)
Artificial
Samplers



PLANKTON

Plankton Net -
Zooplankton



Depth Profile/
Water Column -
Phytoplankton



Data Analysis

- Biological data were analyzed in two primary ways:
 - Metrics – using standard statistical tests
 - Richness (number of taxa)
 - Diversity
 - Index of Biotic Integrity (IBI; benthos HD samples only)
 - Relative Abundance – using PRIMER software
 - Count for each taxon standardized to total sample count
 - Taxa which accounted for the majority of the variability in site differences were determined.

Points to Ponder

- **Sampling plan**
 - **Number of samples per site (statistics & cost)**
 - **Sampling location(s) within site**
 - **Season(s) and year(s)**
 - **Depth (wadable or non-wadable)**
- **Field logistics**
 - **Contact list**
 - **Plan B for sampling schedule (wind, storms)**
- **Laboratories**
 - **Lab evaluation, contracts**
 - **Containers, sample volumes, preservative, shipping/hold times, etc.**
 - **Time for data return (minimum of 6-9 months)**
- **Data Quality Assurance**
 - **Checks at lab AND checks upon receipt of data**